The University of Georgia

Department of Chemistry

DECLARATION UNDER 37 CFR 1.132

I, Dr. James A. de Haseth, hereby declare as follows:

1. I am a Professor of Chemistry in the Department of Chemistry at the University of Georgia, Athens, Georgia and the co-author with Dr. Peter Griffiths of the textbook "Fourier Transform Infrared Spectrometry", Second Edition, Wiley-Interscience, New York, 2007. I have an extensive background in the field of spectroscopy and my curriculum vita is attached hereto setting forth my qualifications and background in that field.

2. Based upon my extensive experience in the field of spectroscopy, I offer the following background:

a. Prior to the 1980's, it was common to prepare liquid and mull samples as thin films between highly polished alkali halide windows. This was a most satisfactory method when highly polished windows could be obtained a relatively low price. Unpolished opaque alkali halide windows, known as "blanks" were available to spectroscopists at a cost that was considerably lower than the cost of highly polished windows. Blanks, which were sold in unpolished form, were unsuitable for spectroscopic analysis unless and until they were polished. It was also common for practicing spectroscopists to know how to polish alkali halide windows. This is a time consuming process and it is a skill that has almost been totally lost to the average spectroscopy lab.

b. With the dominance of rapid data collection FT-IR spectrometers sample preparation became the rate limiting step in spectral measurement. By the 1980's data collection time had become shorter than sample preparation time and spectroscopists, or their lab managers, began to look for ways to reduce preparation and increase efficiency. As unpolished blank alkali halide windows were no longer being polished in the laboratory, the cost of analyses with these windows started to become prohibitively expensive as they had to be purchased from optic vendors in highly polished form at a considerable premium to the price of a "blank". Alternatives to alkali halide windows were sought.

c. Several vendors developed different media for transmission spectrometry of relatively non-volatile liquids, gels and pastes. The first of these devices were cards designed to fit into the sample compartment of a spectrometer, but they used a porous polymer as the sample substrate. I understand the polymer substrates to be described in the 3M patents, which I understand to be U.S. Patent 5,470,757 and U.S. Patent

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5,764,355. The two most common substrates are polytetrafluoroethylene (PTFE) and polyethylene (PE). PE has strong absorption bands in the C-H stretching, bending, and rocking regions of the spectrum and these bands obfuscate, or at the least, distort, the spectrum in those regions. PTFE on the other hand has a series of strong bands in the fingerprint region, that is, below 1500 cm^{-1}. Both substrates obscure important parts of the spectrum and to collect a spectrum without interferences, spectra on both substrates have to be run and then merged together to obtain a good spectrum. This is by no means an easy task.

d. The other common substrate is a mesh, sometimes made of stainless steel or copper, but more likely made of a polymer. I understand the mesh to be described in U. S. Patent 5,453,252 of Truett and which method is referred to as usable to make a screen in 5,764,355 of Gagnon et al. The mesh resembles mosquito screening. Although metal screens do not absorb IR radiation, they do reduce the intensity of the radiation through the sample compartment. In fact, most commercial vendors of FT-IR spectrometers use metal screen to attenuate the beam as these screens do not affect instrument linearity. Polymer screens are not used to attenuate the beam, as the grazing incident radiation over the screen "wires" is absorbed and a spectrum is produced. Most often the spectrum is distorted as sharp derivative bands result from grazing incidence radiation reflected off a polymer surface. In other words, the polymer screens add spectral distortions to the measurement, and all screens reduce the intensity of the radiation.

e. Both screens and polymer substrates have some sampling issues. The polymer substrates are rough, or pebbled, to prevent the production of interference fringes. The roughened surface leads to incomplete coverage of the polymer substrate. Typical deposits do not fill the beam and this leads to measurement artifacts. In addition, the deposits are not uniform in thickness, and this also leads to measurement artifacts. Sample thickness and coverage are an issue with screens. If the sample has sufficient viscosity or surface tension the sample will bridge the holes in the screen, but the thickness of the sample will tend to be greater near the supports and thin in the center. If the viscosity is low, the film will break between the supports and voids will be present in the sample. When voids or incomplete sample coverage takes place the photometric equivalent of "stray light' occurs. In an FT-IR spectrometer this has the effect that the transmittance of peaks will reach a limiting value. Conversely, the absorbance will reach a maximum and the peaks will be distorted. Other bands can reach their appropriate absorbances so the entire spectrum will be distorted in relative band height. This makes identification and interpretation very difficult. It also reduces the chances of identification by search systems as all modern search systems rely upon relative peak height. Non-uniform sample thickness further exacerbates the distortions beyond what is seen with sample voids or incomplete beam coverage.

f. Cleaved or chipped alkali halide windows do not suffer from these problems. The windows have no absorbances to obscure the spectra, and the surfaces are not so rough to prevent uniform coverage by the sample. In other words, the cleaved or chipped windows return the spectroscopist to the most advantageous situation as was

common more than twenty-five years ago. The advantage of the new windows is that can be prepared inexpensively and rapidly.

3. I have read and studied U.S. Patent application 09/977,664 of Robert D. Herpst and I am therefore familiar with the content of that application (hereinafter the "Herpst Application").

4. I have reviewed and understand all of the claims of the Herpst Application including the revised claims attached hereto.

5. As to claim 1 of the attached revised claims, I understand that a finished product, a sample holder, is claimed for use with an infrared spectrophotometer that has an aperture formed therein and an infrared light transmitting crystal sample supporting substrate located in that aperture that allows the infrared light to pass through the crystal sample supporting substrate and no other material is present in that aperture that would substantially absorb the infrared light and where the crystal sample supporting substrate is formed by one or more of the steps of cleaving, fly cutting, chipping, milling or scaling. While the polymer and screen cards previously discussed are porous, and must be porous, a crystal processed in accordance with claim 1 language is not porous.

6. Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping milling or scaling is therefore an unexpected result to those skilled in the art because an optic formed by cleaving, fly cutting, chipping, milling or scaling is not first formed as a blank and is not formed by precision optical polishing, yet the optic transmits sufficient light energy for spectroscopic applications. It is my opinion that it would be unexpected for one skilled in the art of spectroscopy to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filtometer in accordance with the steps and recited features of that claim and that familiarity with the previously discussed prior art relating to sampling substrates made from polymers, screens and crystal blanks (whether polished or unpolished) would not lead one skilled in the art to produce a usable substrate for a sample card in accordance with the recited features of that claim.

7. In my opinion, the same is true of the attached claim 18 that is a method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filtometer, and, again, a final product sample holder is achieved in a manner that is unexpected to me and I believe to those skilled in the art of spectroscopy.

8. Since the same limitation or descriptions that I consider to result in the unexpected result discussed above are also present in later independent claims 30, 39, 45, 46, 47 and 53 attached hereto, it is my opinion that those claims describe an invention that achieves unexpected results.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application of any patent issued under the above referenced application.

James A. de Haseth

James A. de Haseth
Professor of Chemistry

Revised claims – U.S. patent application 09/977,664

1. A sample holder for use with an infrared spectrophotometer or infrared filtometer that analyzes a sample through which infrared light is transmitted comprising a mounting means comprised of a first material having an aperture formed therein, an infrared light transmitting crystal sample supporting substrate being present in the aperture comprised of a second material allowing infrared light to pass therethrough without the infrared light transmitting crystal sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting sample supporting substrate being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

2. The sample holder as defined in claim 1 wherein the infrared light transmitting crystal sample supporting substrate is mounted in the holder such that the perimeter of the aperture frames all or a centrally located part of said infrared light transmitting crystal sample supporting substrate to form an unimepeded path for infrared light to pass through the infrared light transmitting sample supporting substrate.

Claims 3-9. (canceled)

10. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal.

11. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal selected from the group consisting of KBr, NaCl and KCl.

12-14. (canceled)

15. The sample holder as defined in claim 2 further having an infrared light transmitting cover slide window formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

16. The sample holder as defined in claim 15 wherein a spacer is located between said infrared light transmitting crystal sample supporting substrate and said infrared light transmitting cover slide window to create a predetermined space therebetween.

17. The sample holder as defined in claim 15 wherein said infrared light transmitting cover slide window is affixed to said infrared light transmitting crystal sample supporting substrate by a clamping means.

18. A method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filtometer, said method comprising the steps of:

providing a mounting means comprised of a first material having an aperture therethrough;

providing an infrared light transmitting crystal material,

forming an infrared light transmitting crystal sample supporting substrate of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling material from said infrared light transmitting crystal material to form an infrared light transmitting crystal sample supporting substrate that allows the passage of infrared light therethrough;

positioning the infrared light tranmitting crystal sample supporting substrate within the aperture so as to allow infrared light to pass through the aperture and the infrared light transmitting crystal sample supporting substrate and with no other material within the aperture that absorbs infrared light.

19. A method for the manufacture of a sample holder as defined in claim 18 wherein said step of providing a mounting means having an aperture comprises providing a disposable card or demountable card.

20. A method for the manufacture of a sample holder as defined in claim 18 further including the step of:

mounting the infrared light transmitting crystal sample supporting substrate to the holder in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of said aperture.

Claims 21-27. (canceled)

28. A method for the manufacture of a sample holder as defined in claim 18 further including the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to provide a means of sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

29. (canceled)

30. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a first material having infrared light transmissive properties such that the infrared light transmitting crystal substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling the infrared light transmittng crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a second material having at least one aperture adapted to fit within the spectrophotometer or filtometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the spectrophotometer or filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light though the sample, the infrared light transmitting crystal sample supporting substrate and the aperture and no other material within said aperture other than the sample that absorbs infrared light.

31. A method as defined in claim 30 wherein said step of providing a mounting means comprises providing a card made of a disposable material.

32. A method as defined in claim 31 wherein said step of providing an infrared light transmitting material comprises providing an alkali halide crystal material.

33. A method as defined in claim 32 wherein said step of providing an infrared light transmitting material comprises providing a material selected from the group consisting of KBr, NaCl and KCl

34. (canceled)

35. A method as defined in claim 31 wherein said step of providing a mounting means further comprises the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to form a means of

sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate, said infrared light transmitting cover slide window being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling without precision optical polishing of the infrared light transmitting cover slide window.

36. A method as defined in claim 35 wherein said step of placing a sample to be analyzed comprises sandwiching the sample between the infrared light transmitting cover slide window and the infrared light transmitting crystal sample supporting.

37. A method as defined in claim 36 wherein said step placing a sample to be analyzed comprises placing a bacterial colony between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

38. (canceled)

39. A method for using a sample holder for use in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a mounting means comprised of a first material having a plurality of apertures adapted to fit within said infrared spectrophotometer or infrared filtometer, said mounting means being formed so as to be capable of orienting the apertures in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

providing an infrared light transmitting material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling or scaling said infrared light transmitting crystal sample supporting substrates from said light transmitting material,

mounting one of said plurality of said infrared light transmitting crystal sample supporting substrates to the mounting means in a position wherein all or a centrally located part of one of said infrared light transmitting crystal sample supporting substrates is framed by the perimeter of at least one of the apertures,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into said infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with at least one of the apertures aligned with the infrared light emitted by the infrared light source to allow the passage of a beam of infrared light though one or more samples, said infrared light transmitting crystal sample supporting substrates and apertures and no other material other than the sample within said aperture that absorbs infrared light.

40. A method for using a sample holder as defined in claim 39 wherein said step of forming a plurality of apertures and infrared light transmitting crystal sample supporting substrates mounted thereon comprises forming the plurality of apertures and infrared light transmitting sample supporting substrates in a carousel configuration.

41. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample to be analyzed comprises placing a plurality of samples onto said plurality of infrared light transmitting crystal sample supporting substrates and said infrared spectrophotometer or infrared filtometer passes infrared light sequentially through said plurality of samples, said infrared light transmitting crystal sample supporting substrates and said apertures and no other material within said apertures that absorbs infrared light.

42. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample onto at least one of the infrared light transmitting crystal sample supporting substrates comprises placing a bacterial colony onto said at least one infrared light transmitting sample supporting substrate.

43. A method for using a sample holder as defined in claim 40 wherein said step of inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into the infrared spectrophotometer or infrared filtometer comprises inserting the holder in a horizontal position within the infrared spectrophotometer or infrared filtometer and passing a beam of infrared light at least once through the sample, the infrared light transmitting crystal sample supporting substrates and the aperture.

44. A method for using a sample holder as defined in claim 43 wherein the beam of infrared light is passed at least once through the sample by means of reflection.

45. A method for using a sample holder for use in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a plurality of mounting means comprised of a first material, each having at least one aperture, each of said mounting means being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filtometer

providing an infrared light transmitting crystal material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the infrared light transmitting substrates do not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrates formed by cleaving, fly cutting, chipping, milling, or scaling infrared light transmitting crystal sample supporting substrates from said infrared light transmitting crystal material,

mounting one of said plurality of infrared light transmitting crystal sample supporting substrates to each of said plurality of mounting means in a position wherein all or a centrally located part of said sample supporting mounting means is framed by the perimeter of an apertures,

providing a mechanical carousel adapted to fit into the infrared spectrophotometer or infrared filtometer,

mounting said plurality of mounting means onto the mechanical carousel,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the carousel into the infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light in a sequential manner through the plurality of infrared light transmitting crystal sample supporting substrates, said samples and said apertures and no other material other that the samples within said apertures that absorb infrared light.

46. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filtometer, said holder being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

inserting the holder into the infrared spectrophotometer or infrared filtometer to allow the passage of a beam of infrared light though the infrared light transmitting crystal sample supporting substrate to obtain one or more a background scans of the absorbance of the infrared light transmitting crystal sample supporting substrate,

placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light though the infrared light transmitting crystal sample suporting substrate and the sample located thereon and with no other material within said at least one aperture that absorbs infrared light to obtain a scan of the absorbance of the sample and the infrared light transmittting crystal sample supporting substrate, and,

using the one or more background scans to subtract the background absorbance of the infrared light transmitting crystal sample supporting substrate without the sample from the absorbance of the sample and the infrared light transmitting crystal sample supporting substrate.

47. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filtometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by the infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light

transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a medium onto the infrared light transmitting crystal sample supporting substrate with which a sample will be mixed,

inserting the holder into the infrared spectrophotometer or infrared filtometer to allow the passage of a beam of infrared light though the medium and the infrared light transmitting; crystal sample supporting substrate to obtain one or more a background scans of the infrared light transmitting crystal sample supporting substrate and the medium,

placing a sample to be analyzed mixed with the medium onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filtometer analytical instrument between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow infrared light though the infrared light transmitting crystal sample supporting substrate and the medium mixed with the sample and with no other material other than the sample within said at least one aperture that absorbs infrared light and,

using the one or more background scans to subtract the absorbances of the medium and the infrared light transmitting crystal sample supporting substrate from the absorbances of the medium, the infrared light transmitting crystal sample supporting substrate and the sample.

48. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing an alkali halide crystal powder on the infrared light transmitting crystal sample supporting substrate.

49. A method of using a sample holder as defined in claim 48 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing KBr powder on the infrared light transmitting crystal sample supporting substrate.

50. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing mineral oil on the infrared transmitting crystal sample supporting substrate.

51. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a solvent on the infrared light transmitting crystal sample supporting substrate.

52. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a mixture of KBr powder and a solvent or a mineral oil on the infrared light transmitting crystal sample supporting substrate.

53. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmittng crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the spectrophotometer or filtometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a bacterial colony to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the mounting means into the spectrophotometer or filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light though the bacterial colony, the infrared light transmitting crystal sample supporting substrate and the at least one aperture and with no other material other than the bacterial colony within said at least one aperture that absorbs infrared light.

Curriculum Vitae

James Andries de Haseth
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Education: Bachelor of Science in Chemistry (ACS degree), University of Illinois at Chicago, 1972.

Doctor of Philosophy in Analytical Chemistry, University of North Carolina at Chapel Hill, December 9, 1977. Research Director: Professor Thomas L. Isenhour. Dissertation: "Search and Differentiation Algorithms and Information Theory Applied to Chemical Spectroscopic and Biochemical Data."

Academic Employment:

1978-1979	Postdoctoral Research Associate, University of Tennessee, Knoxville, in association with Professor Gleb Mamantov.
1979-1983	Assistant Professor of Chemistry, The University of Alabama, University (Tuscaloosa).
1983-1987	Assistant Professor of Chemistry, University of Georgia, Athens.
1987-1992	Associate Professor of Chemistry, University of Georgia, Athens
1992-present	Professor of Chemistry, University of Georgia, Athens

Other Professional Employment:

1980 (summer)	Research Chemist, U. S. Environmental Protection Agency, Southeast Environmental Research Laboratory, Athens, Georgia.
2003- 2004	Academic leave; U. S. Department of Agriculture, Agricultural Research Service, Quality Assessment Research Unit, Athens, Georgia.

Research Areas

The major research focus is applications of Fourier transform infrared spectrometry, which includes the design of new spectrometers and interferometers. This research is being extended to the design of portable spectrometers for absorption and reflection in the UV through mid-IR regions, fluorescence, and Raman spectrometry. Data processing in the Fourier domain for chemical and spectrometric data and applications of information theory to chemical data are of interest. Research has also involved the interfacing of gas chromatography with FT-IR spectrometry for the development of analysis tools for the computerized identification of GC/FT-IR eluates. Liquid chromatographic interfaces for FT-IR spectrometry to record on-the-fly spectra of LC eluates have also been studied. The same technology has been used to study the dynamics of protein conformation. An additional interface between capillary electrophoresis and Fourier transform infrared spectrometry has been developed. The application of CE/FT-IR spectrometry is primarily for the study of complex carbohydrates. Vibrational Circular Dichroic studies with the use of FT-IR spectrometry have been pursued.

Awards and Honors:

1984-1985	Council for Chemical Research Awardee.
1987	Tour Speaker for the Society for Applied Spectroscopy.
August 1989	Lecture series on Fourier Transform Infrared Spectrometry, presented at the University of Utrecht, The Netherlands.
1989 & 1990	The Ellis R. Lippincott Memorial Lecturer, Bowdoin College, Bowdoin Infrared Course, Brunswick, Maine, July 21, 1989, and July 20, 1990.
April 1990	Lecture series on the Applications of Fourier Transform Infrared Spectrometry, presented at Helsinki, Finland, and Stockholm, Sweden.
1990	Society for Applied Spectroscopy Certificate of Merit for service to the Society.
May 1991	The Annual Chemistry Awards Day Lecturer, The University of Illinois at Chicago, Chicago, Illinois, May 30, 1991.
April 1992	A series of three lectures on Fourier Transform Infrared Spectrometry was presented at The University of Helsinki, Helsinki, Finland.
August 1992	A series of twenty-four lectures was presented on Fourier Transform Infrared Spectrometry. The lectures were presented at Auckland and Wellington in New Zealand, and at Sydney, Brisbane, Perth, Adelaide, Hobart and Melbourne in Australia.
July 1995	Richard C. Lord Lecturer of the Coblentz Society, 1995.
February 2000	A series of ten hours of lectures on chromatography and vibrational spectrometry was given to the Minnesota Chromatography Forum, Minneapolis, Minnesota.
March 2000	A series of seven hours of lectures on FT-IR spectrometry was given to the Pittsburgh Spectroscopy Society

2001	University of Georgia Chemistry Professor of the Year, awarded by the American Chemical Society Student Affiliates.
November 2002	National Academies of Sciences, National Research Council Committee on Testing and Evaluation of Standoff Chemical Detectors.
July 2004	Richard C. Lord Lecturer of the Coblentz Society, 2004.
July 2004	Certificate of Appreciation for Outstanding Contributions to the USDA, awarded by the United States Department of Agriculture.
April 2005	Northeast Georgia Section of the American Chemical Society Research Chemist of the Year, 2004-2005.

Scholarly Activities

Publications

Books authored or co-authored

Griffiths, P. R. and J. A. de Haseth, *Fourier Transform Infrared Spectrometry,* Wiley-Interscience, New York (1986), 656 pages.

Griffiths, P. R. and J. A. de Haseth, *Fourier Transform Infrared Spectrometry, Second Edition,* Wiley-Interscience, New York, in press, to be published April, 2007.

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de Haseth, J. A., "Fourier Transform Infrared Spectroscopy", in *Fourier, Hadamard and Hilbert Transforms in Chemistry,* A. G. Marshall, Ed., Plenum Press, New York (1982).

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Richardson, P. T. and J. A. de Haseth, "An Algorithm for the Encoding of Peaks in Digitized Chromatographic Data", *Computer Applications in the Laboratory,* **1,** 64- 66 (1983).

Gurka, D. F., M. Umaña, E. D. Pellizzari, A. Moseley, and J. A. de Haseth, "The Measurement of On-the-Fly Fourier Transform Infrared Reference Spectra of Environmentally Important Compounds", *Applied Spectroscopy,* **39,** 297-303 (1985).

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"Fourier Domain Processing in FT-IR", University of Alabama in Birmingham, Birming ham, Alabama, April 1980.

"Fourier Transform Infrared Spectrometry: Fourier Domain Studies", Middle Tennessee State University, Murfreesboro, Tennessee, October 1982.

"Spectrometric Investigations in the Fourier Domain", Georgia Institute of Technology, Atlanta, Georgia, February 1983.

"Fourier Transform Infrared Spectrometry", USDA, Athens, Georgia, January 1984.

"Fractals in Spectrometry", University of New Orleans, New Orleans, Louisiana, March 30, 1984.

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"Mid-IR Fiber Probes", presented at Aristech Chemical Corporation, Monroeville, Pennsylvania, November 17, 1993.

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"System Problems and Potential Errors with Fourier Transform Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.

"Protein Conformation by Particle-Beam Infrared Spectrometry," presented at Waseda University, Tokyo, Japan, November, 1998.

"The Determination of Carbohydrate Composition by FT-IR Spectrometry," presented at Kwansei-Gakuin University, Nishinomiya, Japan, November, 1998.

"Quantitative Analysis of Complex Carbohydrates by FT-IR Microspectrometry," presented at a joint meeting of the Minnesota Section of the American Chemical Society and the Minnesota Local Section of the Society for Applied Spectroscopy, Minneapolis, Minnesota, February, 2000.

"Capillary Electrophoresis/FT-IR Spectrometry," presented at Air Products Corporation, Incorporated, Allentown, Pennsylvania, July, 2000.

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"Process Control with Raman Spectrometry," presented at Mettler Toledo AutoChem, Millersville, MD, January 2003.

Supervision of Student Research

Dissertations Directed

Denys François Leclerc University of Georgia 1985
"Fractal Phenomena in FT-IR Data Processing"
Current Employment: Pulp and Paper Research Institute of Canada, Vancouver, BC.

Paul Thomas Richardson University of Georgia 1985
"Fourier Transform Infrared Spectrometry: Environmental Problem Solving by Computer ized Techniques"
Current Employment: E. I. DuPont de Nemours and Co., Wilmington, DE.

Rodolfo Jesus Romañach University of Georgia 1986
"Development of CCC/FT-IR Spectrometry"
Current Employment: Associate Professor, University of Puerto Rico, Mayaguez, PR.

Ellen Victoria Nagy University of Georgia 1988
"The Use of Information Theory in the Prediction of Protein Secondary Structures"
Current Employment: Georgia Pacific, Decatur, GA.

Colleen Ann McCoy University of Georgia 1988
"Advances in Phase Correction and Measurement of Vibrational Circular Dichroism by Double Modulation Fourier Transform Infrared Spectrometry"
Current Employment: unknown. Left Georgia Pacific for medical school.

Miron Gerard Still University of Georgia 1989
"Theoretical Studies of Chiral Stationary Phases"
Current Employment: Whitehall Robbins, Richmond, VA.

Raymond Marion Robertson University of Georgia 1989

"Monodisperse Aerosol Generator Interface Combining Liquid Chromatography with Fourier Transform Infrared Spectrometry"
Current Employment: Hoechst Celanese, Charlotte, NC.

Jeffrey William Sherman University of Georgia 1990
"Studies in Search and Classification Systems Using Window Fourier Domain Data"
Current Employment: Mettler-Toledo, Newark, DE.

Xu-Jin Lü University of Georgia 1991
"Studies of Enantioselective Interactions in Chiral Separations by Fourier Transform Infrared Spectrometry"
Current Employment: Bristol-Myers Squibb, Brunswick, NJ.

Jennifer Elizabeth Andrews University of Georgia 1991
"Mid-Infrared Fiber-Fourier Transform Infrared Spectrometry"
Current Employment: Mettler-Toledo AutoChem, Atlanta, GA.

Glenda Kay Ferguson University of Georgia 1993
"Investigation of Pharmaceutical Analyses with Monodisperse Aerosol Generator Interface Combining Liquid Chromatography with Fourier Transform Infrared (MAGICLC/FT-IR) Spectrometry"
Current Employment: Associate Professor, Wesleyan College, Macon, GA.

Vincent Edward Turula, Jr. University of Georgia 1995
"Dynamic Solution Conformation of Biopolymers by Particle Beam LC/FT-IR Spectrometry"
Current Employment: Wyeth Vaccines, Research Triangle Park, NC.

Xihui Liang University of Georgia 1995
"Target Transformation Factor Analysis in the Study of Polyurethane Foam Formation and Curing and VCD/FT-IR Spectrometry in the Determination of Chiral Separation Mechanisms"
Current Employment: Pfizer, Inc., Groton, CT.

Sanmitra Arvind Bhat University of Georgia 1996
"Study of Polyurethane Foams by Mid-Infrared Fiber/FT-IR Spectrometry and Study of Ester Crosslinking Reactions on Aluminum Surfaces by Infrared-ATR Spectrometry"
Current Employment: Eastman Chemical, Kingsport, TN.

Runhua Zhao University of Georgia 1996
"FT-IR Spectrometry and Capillary Electrophoresis in the Study of Carbohydrates"
Current Employment: Johnson & Johnson, King of Prussia, PA.

Randall Todd Bishop University of Georgia 1997
"Solution Conformation of Peptides and Proteins under Reversed-Phase Chromatography by Particle Beam LC/FT-IR Spectrometry"
Current Employment: Glaxo-Wellcome, Research Triangle Park, NC.

Richard Andrew Todebush University of Georgia 2001
"FT-IR Detection System for Capillary Electrophoresis and a Novel Deposition method for ATR"
Current Employment: Kiel Laboratories, Gainesville, GA.

Richard Brian Melkowits University of Georgia 2002
"The Analysis of Complex Carbohydrates by Fourier Transform Infrared Microspectrometry and Single-Bounce Attenuated Total Reflection Spectrometry"
Current Employment: Noveon Plastics, Cleveland, OH.

Jessica Lea Jarman University of Georgia 2003
"Developments in Capillary Electrophoretic Instrumentation and FT-IR Spectrometric Detection, and Semi-Automated FT-IR Spectrometric Sample Deposition"
Current Employment: GE Plastics, Mt. Vernon, IN

Andrew Gardner Adams Thomas University of Georgia 2003
"FT-IR Spectrometric Studies of Carbohydrates and Proteins"
Current Employment: Gainesville College, Gainesville, GA.

Theses Directed

Kalam Abul Mir University of Georgia 1985
"Computerized Structure Elucidation in Infrared Spectrometry"
Current Employment: Formerly employed by the Armed Forces Food & Drug Laboratory, Bangladesh, recently earned a Ph.D. at Queen's University, Kingston, Ontario, Canada

Cindy Robin Friedman University of Georgia 1985
"Gas Phase Rapid-Scanning Fourier Transform Infrared/Time-Resolved Spectrometry"
Current Employment: Formerly employed by Spectra-Tech, Inc., Shelton, CT. Now marketing manager for a manufacturer of health equipment.

Hilda Velazquez University of Georgia 1985
"Very Wide-Bore Capillary Gas Chromatography"
Current Employment: Universidad Nacional Experimental del Tachira, Venezuela

Maritza Ivonne Quiñones University of Georgia 1986
"Wide Bore Capillary Gas Chromatography/Fourier Transform Infrared Spectrometry"
Current Employment: United States Department of Agriculture, Athens, GA.

Seldon Penn Weaver University of Georgia 1986
"Gas-Phase Rapid-Scanning Fourier Transform Infrared/Time-Resolved Spectreometry (FT-IR/TRS)"
Current Employment: Amorphous Silicon, Inc. Moses Lake, WA.

Julie Lynne Hust University of Georgia 1991
"A Window Fourier Domain Structural Search System"
Current Position: unknown. Received doctorate in Chemical Education at Ohio University; may be teaching at the high school level.

Joel Allen Caughran University of Georgia 1994
"Correlations Between the Mechanical Properties and Attenuated Total Reflectance Infrared Spectra of Polyurethane Foams"
Current Employment: Department of Chemistry, University of Georgia, Athens, GA.

William Maddux McClarin, III University of Georgia 1995
"Investigations of a Chiral Separation Mechanism Using Fourier Transform Infrared Spectrometry and Two-Dimensional Nuclear Magnetic Resonance Spectrometry"
Current Employment: Thiele-Kaolin Corporation, Sandersville, GA.

Melissa Chanda Berry Medlin University of Georgia 1996
"Analytical Evaluation of Dialkyl Phosphates as Indicators of Organophosphorus Pesticide Exposure"
Current Employment: Kimberly Clarke Corporation, Doraville, GA.

Yu Cang University of Georgia 2000
"Studies of Processed Cotton Fabrics and Dental restorative Resin Materials with the Use of Fourier Transform infrared Spectrometry"
Current Employment: unknown. Pursued a graduate degree in Computer Science at the University of North Carolina at Charlotte.

Ushiri KulatungaUniversity of Georgia 2000
"Separation of Monosaccharides Found in Glycoproteins by Capillary Electrophoresis" Current Employment: Instructor, Athens Technical College, Athens, GA.

Tracey Leigh Cash University of Georgia 2001
"Applications of Capillary Electrophoretic Analysis"
Current Employment: Eli Lilly and Company, Indianapolis, IN.

Postdoctoral Research Associates

Vincent E. Turula, Jr, 1995-1996
Current Employment: Wyeth Vaccines, Research Triangle Park, NC.

Lin-Tao He, 1996-1997.
Current Employment: Beijing Institute of Microchemistry, Beijing, China.

Editorial responsibilities

Associate Editor: *Applied Spectroscopy* (1982-1993)
Applied Spectroscopy Reviews (1995 -2001)

Journal Referee: *American Chemical Society Audio Courses*
American Chemical Society Symposium Series
American Society for Testing and Materials Special Publications
Analytical Chemistry
Applied Spectroscopy
Biophysical Journal
Chemometrics and Intelligent Laboratory Systems
Energy & Fuels

Journal of Agricultural and Food Science
Journal of the American Chemical Society
Journal of Chemical Information and Computer Science
Journal of Chromatography
Journal of Chromatography A
Journal of Computational Chemistr
Journal of Environmental Monitoring
Journal of High Resolution Chromatography and Chromatographic Communications
Journal of Molecular Structure
Journal of Molecular Structure
Journal of Physical Chemistry
LC/GC The Magazine of Separation Science
Planta
Science
Spectrochimica Acta, Part B
Spectroscopy
Talanta
The Analyst

Papers Presented at Scientific Meetings

Keynote Addresses

de Haseth, J. A., "New Trends in Biomedical FT-IR Spectrometry", presented at the Fifth International Symposium on New Spectroscopic Methods in Biomedical Research, Seattle, Washington, October 1986.

de Haseth, J. A., "Vibrational Spectrometry: Abreast with New Technology," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.

de Haseth, J. A., "Data Processing Pitfalls: Possible Problems with Spectral Data Processing and Sample Preparation," presented at the Third International Infrared Users' Group Meeting [of Art Conservationists and Art Preservationists], Winterthur, Delaware, May 28-30, 1998.

Plenary

de Haseth, J. A., "Mathematics of Spectral Treatment in the Fourier Domain", presented at the 1985 International Conference on Fourier Transform and Computerized Infrared Spectroscopy, Ottawa, Ontario, Canada, June, 1985.

de Haseth, J. A., "MAGIC, VCD and Other Improbable Techniques", presented at the Meeting of the Infrared and Raman Discussion Group of Great Britain, King's College, University of London, London, England, December 15, 1988.

de Haseth, J. A., "Mid-Infrared Fibers and Probes," presented at the 10th International Conference on Fourier Transform Spectroscopy, Budapest, Hungary, August, 1995.

de Haseth, J.A., V.E. Turula, R.T. Bishop, and R. Zhao, "LC and CE/FT-IR Spectrometry in Trace Analysis," presented at the 26th International Symposium on Environmental Analytical Chemistry, Vienna, Austria, April, 1996.

de Haseth, J. A., "A Metal Nebulizer Capillary Electrophoresis/FT-IR Spectrometric Interface," Fifth International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers, Bruges, Belgium, February, 2000.

de Haseth, J. A., "Capillary Electrophoresis/FT-IR Spectrometry," 30th International Symposium on Environmental Analytical Chemistry, Espoo, Finland, August, 2000.

Invited Presentations in Symposia

de Haseth, J. A., "Bibliographic Text Searching on a Minicomputer", presented at the American Society Workshop on Computers in Chemistry, Chicago, Illinois, August 1975.

Isenhour, T. L., J. A. de Haseth, G. T. Rasmussen, and W. S. Woodward, "Visual Information Interpretation - A Low Cost Color Display System", presented at the Third Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, November 1976.

de Haseth, J. A., and T. L. Isenhour, "An Information Theoretical Approach to the Determina tion of Secondary Structure in Globular Proteins", presented at the 173rd American Chemical Society National Meeting, New Orleans, Louisiana, March 1977.

de Haseth, J. A., "An Interferogram-Based Search System for Vapor Phase Fourier Transform Data", presented at the Eighth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1981.

de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to Interferometric Searches", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1982.

de Haseth, J. A., "Spectral Transformation: An Identification Tool", presented at the ASTM E13.03 Infrared Spectroscopy Symposium, "The Computer: Friend or Foe", Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1982.

de Haseth, J. A., "Fractal Analysis of Time Domain Data", presented at the 36th Annual Summer Symposium on Analytical Chemistry, "Fourier Transforms and Their Applications to Instrumental Analysis", Lincoln, Nebraska, June 1983.

de Haseth, J. A., "Stroboscopic FT-IR Spectroscopy - Past, Present and Future", presented at the 36th Annual Summer Symposium on Analytical Chemistry, "Fourier Transforms and Their Applications to Instrumental Analysis", Lincoln, Nebraska, June 1983.

de Haseth, J. A., S. P. Weaver, P. T. Richardson, and R. J. Romañach, "Considerations on the Chromatography/Spectrometry Interface", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 14, 1984.

de Haseth, J. A., D. F. Leclerc, and P. T. Richardson, "Fourier Transforms for Spectral Identification", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 15, 1984.

de Haseth, J. A., and D. F. Leclerc, "Scaling Fractals in Spectrometry", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 15, 1984.

de Haseth, J. A., "Fourier Domain Infrared Spectral Recognition", presented at the First Conference on Spectral Pattern Recognition, Aberdeen Proving Ground, Maryland, December 11, 1984.

de Haseth, J. A., "Pesticide Analysis by GC and LC/FT-IR Spectrometry", presented at the 15th Annual Symposium on the Analytical Chemistry of Pollutants, Jekyll Island, Georgia, May 21, 1985.

de Haseth, J. A., "Fractals: Discrete Mathematics for Optimization of Signal Versus Noise", presented at the Gordon Conference on Analytical Chemistry, New Hampton, New Hampshire, August 14, 1985.

de Haseth, J. A. and R. J. Romañach, "High Speed Countercurrent Chromatography/Fourier Transform Infrared Spectrometry", presented at the 24th Annual Eastern Analytical Symposium, New York, New York, November 21, 1985.

de Haseth, J. A., "High Speed Countercurrent Chromatography/Fourier Transform Infrared Spectrometry", presented at the 39th Annual Summer Symposium on Analytical Chemistry, "Chromatographic/Spectroscopic Combinations", Salt Lake City, Utah, June 18, 1986.

de Haseth, J. A., "Computer-Assisted Identification of Infrared Spectra", presented at the Third International Conference on Diffuse Reflectance Spectroscopy, Chambersburg, Pennsylvania, August 20, 1986.

de Haseth, J. A. and R. J. Romañach, "CCC/FT-IR Spectrometry", presented at the 13th Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, St. Louis, Missouri, October 3, 1986.

de Haseth, J. A., "New Trends in FT-IR: An Overview", presented at the 25th Annual Eastern Analytical Symposium, New York, New York, October 23, 1986.

de Haseth, J. A., "Fractals in FT-IR Spectrometry", presented at the Second Annual Scientific Computing and Automation Conference and Exposition, Atlantic City, New Jersey, November 7, 1986.

de Haseth, J. A., "Introduction to Fourier Transform Infrared Spectrometry", presented at the 193rd American Chemical Society National Meeting, Denver Colorado, April 5, 1987.

de Haseth, J. A., "Qualitative and Quantitative Analysis in the Fourier Domain", presented at the 193rd American Chemical Society National Meeting, Denver, Colorado, April 8, 1987.

de Haseth, J. A. and C. A. McCoy, "Advances in VCD-FT-IR Spectrometry", presented at the Pacific Conference on Chemistry and Spectroscopy, Irvine, California, October 29, 1987.

de Haseth, J. A., "Chemical Instrumentation Based upon the Fourier Transformation", presented at the Third Chemical Congress of North America, Toronto, Ontario, Canada, June 7, 1988.

de Haseth, J. A., "MAGIC-LC/FT-IR Spectrometry", presented at the 18th International Symposium on Environmental Analytical Chemistry and the 4th International Congress on Analytical Techniques in Environmental Chemistry, Barcelona, Spain, September 5, 1988.

de Haseth, J. A. and R. M. Robertson, "MAGIC-LC/FT-IR Spectrometry", presented at the Benedetti-Pichler Award Symposium Honoring Professor Richard F. Browner, 27th Eastern Analytical Symposium, New York, New York, October 6, 1988.

de Haseth, J. A. and C. A. McCoy, "FT-IR Vibrational Circular Dichroism Spectrometry: Status and Applications", 27th Eastern Analytical Symposium, New York, New York, October 7, 1988.

de Haseth, J. A., R. M. Robertson, and R. F. Browner, "MAGIC-LC/FT-IR Spectrometry", presented at the 15th Federation of Analytical and Spectroscopy Societies Meeting, Boston, Massachusetts, November 1, 1988.

de Haseth, J. A., "Hyphenated Methods in Fourier Transform Infrared Spectrometry", presented at the Infrared and Raman Discussion Group of The Netherlands, The University of Utrecht, Holland, August 25, 1989.

Browner, R. F. and J. A. de Haseth, "A Novel Interface for LC-Infrared Spectroscopy", presented at the International Symposium on Detection in Liquid Chromatography and Flow Injection Analysis (HPLC/FIA), Córdoba, Spain, September 21, 1989.

de Haseth, J. A. and J. E. Andrews, "Fiber Optics Applications in the Mid-Infrared", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

de Haseth, J. A., R. M. Robertson, and G. K. Ferguson, "A Practical Full Bandwidth Detector for Liquid Chromatography", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

de Haseth, J. A. and R. F. Browner, "Development of a MAGIC Interface for HPLC/FT-IR", presented at the 13th Annual Conference on Analysis of Pollutants in the Environment, Norfolk, Virginia, May 9, 1990.

de Haseth, J. A., "An Infrared Detection System for Liquid Chromatography", presented at the North Jersey Chromatography Meeting, Norwalk, Connecticut, June 8, 1990.

de Haseth, J. A., "Infrared Spectrometry of Non-Traditional Samples", presented at the 11th Biennial Conference on Chemical Education, Atlanta, Georgia, August 7, 1990.

Andrews, J. E. and J. A. de Haseth, "Kinetic Studies with the Use of Mid-Infrared Fibers", presented at 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October 9, 1990.

de Haseth, J. A., "Why FT-IR? An Overview", presented at the 35th Annual Meeting of the Biophysical Society, San Francisco, California, February 25, 1991.

de Haseth, J. A. and J. E. Andrews, "Polyurethane Monitoring by Mid-Infrared Fiber Fourier Transform Spectrometry", presented at the 8th International Conference on Fourier Transform Spectroscopy, Lübeck-Travemünde, Germany, September 1-6, 1991.

de Haseth, J. A., "Mid-infrared Fibers in Flexible Foams", presented at the Joint Meeting Federation of Analytical Chemistry and Spectroscopy Societies/Pacific Conference, Anaheim, California, October 6-11, 1991.

de Haseth, J. A., R. D. Priester, Jr., J. V. McCluskey, and D. Cortelek, "Mid-Infrared Fiber Monitoring of RIM Polyurethanes", presented at the Joint Meeting Federation of Analytical Chemistry and Spectroscopy Societies/Pacific Conference, Anaheim, California, October 6- 11, 1991.

de Haseth, J. A., "Mid-Infrared Fiber Probes," presented at the Societá Chimica Italiana, Divisione di Chimica Analytica, Gargnano (Brescia), Italy, April 22-23, 1992.

de Haseth, J. A., "Polymer Monitoring with Mid-IR Fibers", presented at the International Symposium on Optical Tools for Manufacturing and Advanced Automation, Boston, Massachusetts, September 7-10, 1993.

de Haseth, J. A., "Historical Perspectives of FT-IR Analytical Techniques", presented at the International Symposium on Optical Sensing for Environmental Monitoring, Atlanta, Georgia, October 11-14, 1993.

de Haseth, J. A., R. Zhao, S. A. Bhat, X. Liang, and R. A. Dluhy, "Mid- and Near-IR Fiber Probes," presented at the 21st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, St. Louis, Missouri, October, 1994.

de Haseth, J. A., "The Use of Mid-Infrared Fibers in Polymer Analysis," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.

de Haseth, J. A., "Vibrational Circular Dichroism/Fourier Transform Infrared Spectrometry of the Mechanisms in Chiral Separations," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.

de Haseth, J. A., "The Investigation of Protein Conformation with the Use of Particle Beam/Infrared Spectrometry," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.

de Haseth, J. A., "Infrared Spectrometry in Pesticide Analysis at the Sub-Nanogram Level," presented at the Southeastern Meeting of the Association of Official Analytical Chemists, Atlanta, Georgia, February, 1995.

de Haseth, J.A., X. Liang, and S.A. Bhat, "Mid-Infrared Fiber Probes as Reaction Monitors," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 1995.

de Haseth, J.A., "Infrared Spectrometry in the Near and Immediate Future," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1995.

de Haseth, J.A., "Characterization of Protein Folding by Particle Beam FT-IR Spectrometry," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1995.

de Haseth, J.A., V.E. Turula, and R.T. Bishop, "Protein Conformation by Particle Beam Infrared Spectrometry," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.

de Haseth, J. A., "Measurement of Dynamic Protein Conformation by Particle Beam LC/FT-IR Spectromety," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1997.

de Haseth, J. A., "Capillary Electrophoresis/FT-IR Spectrometry," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 1998.

de Haseth, J. A., "Combination of Proteolytic Digest and Deuterium Labeling for the Determination of Protein Structure," to have been presented at the American Chemical Society National Meeting, Boston, Massachusetts, August 23-27, 1998. [Withdrew; death in family.]

de Haseth, J. A., "Particle Beam LC/FT-IR and CE/FT-IR Spectrometry," presented at the Spectroscopy Society of Japan National Meeting, Osaka, Japan, November 19-20, 1998.

de Haseth, J. A., "Hyphenated Techniques and FT-IR Spectrometry: What's Wrong?," invited for presentation at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1998. [Declined: this symposium coincided with the lectures in Japan.]

de Haseth, J. A., "Successive Average Orthogonalization and Iterative Target Transformation Factor Analysis," Lectures on Chemometrics, Waseda University, Tokyo, Japan, August 22, 1999.

de Haseth, J. A., "The Drive for Ultimate Sensitivity: Interfaces Between Separations Technologies and FT-IR Spectrometry," presented in the Williams-Wright Award Symposium at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2001.

de Haseth, J. A., "Composition of Oligosaccharides with the Use of Chemometrics and Infrared Spectrometry," presented at IUPAC International Congress on Analytical Sciences, Waseda University, Tokyo, Japan, August 7, 2001.

de Haseth, J. A., "Errors and Anomalies in FTS," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.

de Haseth, J. A., "Specular and Internal Reflection Spectrometry," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.

de Haseth, J. A., "Univariate and Multivariate Quantitative Analysis," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.

de Haseth, J. A., R. A. Todebush, and J. L. Jarman, "Capillary Electrophoresis/Fourier Transform Infrared Spectrometry," presented at the Seventh International Symposium on Hyphenated Techniques in Chromatography, Brugges, Belgium, February 6-8, 2002.

de Haseth, J. A. and J. L. Jarman, "Capillary Electrophoresis/FT-IR Spectrometry: How Small and How Useful?" to be presented in the Bomem-Michelson Award Symposium at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.

Barton II, F. E., D. S. Himmelsbach, J. A. de Haseth, W. R. Windham, and W. H. Smith, "The Use of Interferometers and Imaging Spectrometers for Agricultural Applications," presented at the Australian NIR Group Meeting, Freemantle, W.A., Australia, April 1720, 2004.

Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Moving from the Laboratory to the Field with NIR," International Diffuse Reflectance Conference, Chambersburg, PA, August 8-13, 2004.

Himmelsbach, D. S., F. E. Barton II, and J. A. de Haseth, "Use of Two-dimensional Vibrational Correlation with Near-, Mid-Infrared and Raman Spectroscopy to Study Agricultural Problems," presented at the 31st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.

de Haseth, J. A., F. E. Barton, II, and D. S. Himmelsbach, "End User Specification and Justification of a New Field-Ready NIR Spectrometer Design," presented at the 31st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.

Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Applications for a New Series of NIR Spectrometers," presented at the 31st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.

de Haseth, J. A. and Shelly I. Seerley, "Attenuated Total Reflection Direct-Deposition Nanosampler," presented at the 31st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.

Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Applications for a New Series of NIR Spectrometers," presented at the Eastern Analytical Symposium, Sommerset, NJ, November 15-18, 2004.

Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "New Instruments for Measuring the Quality of Agricultural Commodities," presented at the 33rd U.S.-Japan Cooperative Program on Natural Resources, Honolulu, HI, December 9-17, 2004.

Himmelsbach, D. S., F. E. Barton, and J. A. de Haseth, "Using Two-Dimensional Vibrational Correlation Spectroscopy to Study Agricultural Programs," presented at the 33rd U.S.-Japan Cooperative Program on Natural Resources, Honolulu, HI, December 9-17, 2004.

Barton F. E., II, J. A. de Haseth, and D. S. Himmelsbach, "Progress in Developing a New Series of NIR Spectrometers," presented at the 34th U.S.-Japan Cooperative Program on Natural Resources, Sukuono, Japan, October 21-27, 2005.

Barton, Franklin E., II, James A. de Haseth, and Davis S. Himmelsbach, "2D Correlation Spectroscopy to Evaluate a New Series of NIR Spectrometers," presented at the 5th Conference of 2D Correlation Spectrometry, Delavan, WI, August 16-18, 2005.

Barton, Franklin E., II, James A. de Haseth, and Davis S. Himmelsbach, "The Need for New Instrumentation for Agricultural Applications," presented at the 12th International Conference on Near Infrared Spectroscopy, Sky City, Auckland, New Zealand, April 10-15, 2005.

Franklin E. Barton, II, David S. Himmelsbach, William R. Windham, and James A. de Haseth, "Hyperspectral Imaging: The Agricultural Perspective," International Society for Optical Engineering, Orlando, FL, March 10-15, 2006.

Franklin E. Barton, II, James A. de Haseth, and David S. Himmelsbach, "Interferometers vs Imaging Spectrometers for NIR Applications," Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Orlando, FL, September 24-29, 2006.

de Haseth, James A., J. Brian Loudermilk, David S. Himmelsbach, and Franklin E. Barton, II, "Improvements in Infrared Spectral Database Searching," presented at the 35th U.S.-Japan Cooperative Program on Natural Resources, Sonoma, CA, October 22-27, 2006.

Submitted Presentations

Isenhour, T. L., H. B. Woodruff, S. R. Lowry, and J. A. de Haseth, "Text-Searching of Chemical Data Bases", presented at the 170th American Chemical Society National Meeting, Chicago, Illinois, August, 1975.

de Haseth, J. A., H. B. Woodruff, and T. L. Isenhour, "Applications of Text-Searching for the Detection of Errors in Chemical Data Bases", presented at the 170th American Chemical Society National Meeting, Chicago, Illinois, August, 1975.

de Haseth, J. A., W. S. Woodward, and T. L. Isenhour, "Direct Computer Encoding of Recorded Spectra", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.

de Haseth, J. A., H. B. Woodruff, S. R. Lowry, and T. L. Isenhour, "Text-Searching Applied to Mass Spectroscopy", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.

Rasmussen, G. T., J. A. de Haseth, W. S. Woodward, S. R. Lowry, and T. L. Isenhour, "Two Years Experience with an In-House Chemical Abstracts Current Awareness Service", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.

de Haseth, J. A., and T. L. Isenhour, "The Direct Reconstruction of Gas Chromatograms from Interferometric GC/IR Data", presented at the Second International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1977.

de Haseth, J. A., A. A. Garrison, R. A. Crocombe, and G. Mamantov, "Time Resolved Infrared Investigations of Photolysis of Small Molecules", presented at the 31st Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1980.

de Haseth, J. A., and L. V. Azarraga, "Initial Attempts to Reduce Interferometric Data for Efficient Infrared Searches", presented at the 32nd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1981.

de Haseth, J. A., "Analysis of Spectral Anomalies in Rapid Scanning Fourier Transform Time-Resolved Infrared Spectrometry (TRS)", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.

de Haseth, J. A., "Interferometer Stability in Gas Chromatography/Fourier Transform Infrared Spectroscopy", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.

Azarraga, L. V., R. R. Williams, and J. A. de Haseth, "Initial Results from an Interferogram-Based Search System for GC/FT-IR", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.

de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to FT-IR Interferograms", presented at the 33rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1982.

Leclerc, D. F., and J. A. de Haseth, "Interferogram Data Processing in FT-IR", presented at the 33rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1982.

de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to Time Domain Signals", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September, 1982.

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Jarman, J. L. and J. A. de Haseth, "Continued Optimization and Characterization of a Glass Nebulizer CE/FT-IR Interface for Transmission Analyses," presented at the Federation of Analytical Chemistry and Spectroscopy Societies, Providence, Rhode Island, October, 2002.

Seerley, S. I., J. L. Jarman, and J. A. de Haseth, "Semi-Automatic Sample Deposition for Micro ATR/FT-IR Spectrometry," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.

Jarman, J. L. and J. A. de Haseth, "FT-IR Spectrometric Detection in Capillary Electrophoretic Separations," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.

Thomas, A. G. A. and J. A. de Haseth, "ATR Infrared Composition Analysis of Intact Oligosaccharides," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.

Jarman, J. L. and J. A. de Haseth, "Application of FT-IR Spectrometric Detection in Capillary Electrophoretic Separations," presented at the 2004 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL, March 8-11, 2004.

Barton, F. E., II, J. A. de Haseth, and D. S. Himmelsbach, "Interferometers vs Imaging Spectrometers for NIR Applications," presented at Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Lake Buena Vista, FL, September 24-28, 2006.

Loudermilk, J. B., F. E. Barton, II, D. S. Himmelsbach, and J. A. de Haseth, "Novel Search Algorithms for a Mid-IR Spectra Database of Cotton Contaminats," presented at Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Lake Buena Vista, FL, September 24-28, 2006.

Professional Service

Continuing Education

Co-Director: Society for Applied Spectroscopy Short Course on Fourier Transform Infrared Spectrometry.

Presented: Philadelphia, PA, September 1982; Philadelphia, PA, September 1983; Pasadena, CA, October 1983; Philadelphia, PA, September 1984; Philadelphia, PA,

September 1985; St. Louis, MO, September 1986; Atlantic City, NJ, March 1987; Irvine, CA, October 1987; New Orleans, LA, February 1988; Boston, MA, October 1988; Atlanta, GA, March 1989; Chicago, IL, September 1989; New York, NY, February 1990; Cleveland, OH, October 1990; Chicago, IL, March 1991; Anaheim, CA, October 1991; New Orleans, LA, March 1992; Philadelphia, PA, September 1992; Atlanta, GA, March 1993; Detroit, MI, October 1993; Chicago, IL, February 1994; St. Louis, MO, October 1994; New Orleans, LA, February 1995; Cincinnati, OH, October, 1995; Chicago, IL, March 1996; Kansas City, MO, September 1996; Nashville, TN, September 1999.

Independent presentations: The Perkin-Elmer Corporation, Ridgefield, CT; Standard Oil of Ohio, Cleveland, OH; Dow Chemical USA, Freeport, TX; PPG Industries, Pittsburgh, PA; Alcoa, Pittsburgh, PA; Colegio de Quimicos de Puerto Rico, San Juan, PR.

Co-Director: Pittsburgh Conference Shortcourse on Advanced Fourier Transform Infrared Spectrometry.

Presented: Atlanta, GA, March 1997; New Orleans, LA, March 1998.

Co-Director: Pittsburgh Conference Shortcourse on Measuring and Enhancing the Performance of FT-IR Spectrometers.

Presented: Orlando, FL, March 1999; New Orleans, LA, March 2000; New Orleans, LA, March 2001; New Orleans, LA, March 2002; Orlando, FL, March 2003; Chicago, IL, February 2004.

Co-Director: Pittsburgh Conference Shortcourse on FT-IR Spectrometry of Surface Layers.

Presented: Orlando, FL, March 1999 ; New Orleans, LA, March 2000; New Orleans, LA, March 2001; New Orleans, LA, March 2002 ; Orlando, FL, March 2003; Chicago, IL, February 2004; Orlando, FL, March 2005; Orlando, FL, March 2006; to be presented Chicago, IL, February, 2007.

Instructor: 1st Euro-American Intensive Shortcourse on Advanced Infrared and Raman Spectroscopy, Hungarian Academy of Sciences, Veszprém, Hungary, August 1995.

Organizer and Co-Director: Society for Applied Spectroscopy Workshop on Fourier Transform Infrared Spectrometry.

Presented: Athens, GA, July 1985; Athens, GA, July 1986; Athens, GA, June 1987; Athens, GA, July 1988.

Infrared Spectroscopy Shortcourses and Workshops.

Presented at Bowdoin College, Brunswick, ME: July 1989; July 1990; July 1991; July 1992; July 1993; July 1994; July 1995; July 1996; July 1997: July 1998; July 1999; July 2001; July 2002; July 2003; July 2004; July 2005; July 1006.
To be presented: July 2007.

Independent presentations: Aspenäs (Lerum), Sweden, May 1990; Aspenäs (Lerum), Sweden, June 1993; Aspenäs (Lerum), Sweden, May 1996; University of Warwick (Coventry), U.K., May, 1997; Stenungsund, Sweden, May 2002; Glumslöv, Sweden, May 2005.

Offices in Professional Societies

Coblentz Society

Membership Committee (Chairman) 1982 - 1997.

Committee on Spectral Digitization 1985 - 1987.

Board of Managers 1985 – 1989.

Ellis Lippincott Award Selection Committee, sponsored by the Society for Applied Spectroscopy, the Coblentz Society and the Optical Society of America (Member 1983 - 1984, as a Coblentz Society representative).

Society for Applied Spectroscopy

Meggers Award Committee (Chairman-Elect 1985, Chairman 1986).

Membership Education Committee (Member 1987 – 1989, Chairman 1988).

Ellis Lippincott Award Selection Committee, sponsored by the Society for Applied Spectroscopy, the Coblentz Society and the Optical Society of America (Member 1987, Chairman 1988, for the Society for Applied Spectroscopy).

Membership Education Coordinator (Coordinator Elect 1992, Coordinator 1993-1996, member 1997).

Executive Committee, 1993-1994.

President-Elect 2006, President 2007, Past-President 2008.

International Conferences

Secretary, Symposium on the Analytical Chemistry of Pollutants, 1985 - 2001.

11th International Conference on Fourier Transform Spectroscopy (ICOFTS), August 1997, at Athens, GA. General Chairman.

International Conference on Fourier Transform Spectroscopy (ICOFTS), International Steering Committee (Member 1995-2003, Chair 2001-2003).

General Chairman for the 25th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June 19 through 21, 1995.

General Chairman for the 27th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June 15 through 19, 1997.

General Chairman for the 29th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, May 23 through 27, 1999.

Service in Professional Societies

GC-IR Sub-Committee of the Coblentz Society Evaluation Committee 1976 - 1979.

Analytical Program Chairman: 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November 1982.

Conference Organizer and General Chairman - Southeastern Association of Analytical Chemists (SEAAC) Meeting, Athens, Georgia, April 1985.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, November 1984.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, November 1985.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, October 1988.

Session Organizer and Chairman - 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

Award Symposium Organizer and Chairman - Ellis R. Lippincott Award Symposium presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

Session Organizer and Chairman - 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October, 1990.

Vibrational Spectroscopy Session Organizer - 18th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Anaheim, California, October 6-11, 1991.

Session Organizer and Chairman, Applications of Infrared Fibers to Mid- and Near-IR Spectroscopy - 21st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, St. Louis, Missouri, October 1994.

DECLARATION UNDER 37 CFR 1.132

I, Dr. Edward M. Smolyarenko, hereby declare as follows:

1. I have been an optical materials scientist for over 40 years. I have a Ph.D. in materials science from the Institute of Solid State Physics and Semiconductors, Minsk Belarus (1962) where I was a Research Scientist and latter a Senior Research Scientist from 1962 to 1989. I was a Senior Research Scientist at Inrad, Inc. from 1990 to 1992. I was Director of Crystal Technology at International Crystal Laboratories ("ICL") from 1992 to 2003 and I have consulted with ICL on a part time basis since 2003. I hold 5 Soviet patents and have written dozens of articles, all of which deal with optical materials and crystal growth. A partial list of my publications and a list of my patents is attached. I have extensive experience with optics and optical devices. In my professional capacity I have been intimately familiar with the means of, and requirements for, processing optics for use in optical devices of all kinds.

2. I have read and studied U.S. Patent application 09/977,664 of Robert D. Herpst, and I am therefore familiar with the content of that application (hereinafter the "Herpst Application").

3. I have reviewed and understand all of the revised claims of the Herpst Application which are attached to this Declaration.

4. As to claim 1 of the Herpst Application, I understand that a finished product, a sample holder, is claimed for use with an infrared spectrophotometer that has an aperture formed therein with an infrared light transmitting crystal sample supporting substrate located in that aperture that allows the infrared light too pass through the crystal sample supporting and no other material is present in that aperture that would substantially absorb the infrared light and where the crystal sample supporting substrate is formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

5. It is my opinion, that it would be unexpected for one skilled in the art of optics or optical materials to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filtometer in accordance with the steps and recited features of that claim.

6. In my opinion, the same is true of claim 18 that is a method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filtometer, and, again, a final product sample holder is achieved in a manner that is unexpected to me and I believe to those skilled in the art of optics or optical materials.

7. Since the same limitation or descriptions that I consider to result in the unexpected result discussed above are also present in later independent claims 30, 39, 45, 46, 47 and 53, it is my opinion that those claims describe an invention that achieves unexpected results.

8. In the field of optics and optical materials, it is well known that optics have been precision processed for virtually every application in which they have been used as components of an optical product or optical device, including those optical devices used in spectroscopy for sample analysis. In its crudest form, precision processing comprises grinding an optical material to make the surfaces flat and parallel to form what is known in the industry as a "blank". An optical blank is opaque and cannot be used in an optical device until the opaque surfaces are made transmissive to energy or light by polishing means. The grinding operation to form a blank is normally done on precision optical equipment such as a planetary lapping machine. Precision polishing of an optic comprises grinding the light transmitting surfaces of an optical material with successively smaller particles of grinding or polishing compounds such as Garnet or Aluminum Oxide until the optic becomes sufficiently transmissive to light or energy for the application for which it is intended. Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping, milling, or scaling is therefore an unexpected result to those skilled in the art because cleaving, fly cutting, chipping, milling or scaling creates an optic which has not been processed as a blank and has not been precision optically polished yet the optic transmits sufficient light or energy for spectroscopic applications.

9. It is well known in the field of crystal growth and optics that a crystal is a solid and that a crystal is not porous.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application of any patent issued under the above referenced application.

E Smolyarenko 02/23/07

Edward M. Smolyarenko

1. A sample holder for use with an infrared spectrophotometer or infrared filtometer that analyzes a sample through which infrared light is transmitted comprising a mounting means comprised of a first material having an aperture formed therein, an infrared light transmitting crystal sample supporting substrate being present in the aperture comprised of a second material allowing infrared light to pass therethrough without the infrared light transmitting crystal sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting sample supporting substrate being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

2. The sample holder as defined in claim 1 wherein the infrared light transmitting crystal sample supporting substrate is mounted in the holder such that the perimeter of the aperture frames all or a centrally located part of said infrared light transmitting crystal sample supporting substrate to form an unimepeded path for infrared light to pass through the infrared light transmitting sample supporting substrate.

Claims 3-9. (canceled)

10. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal.

11. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal selected from the group consisting of KBr, NaCl and KCl.

12-14. (canceled)

15. The sample holder as defined in claim 2 further having an infrared light transmitting cover slide window formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

16. The sample holder as defined in claim 15 wherein a spacer is located between said infrared light transmitting crystal sample supporting substrate and said infrared light transmitting cover slide window to create a predetermined space therebetween.

17. The sample holder as defined in claim 15 wherein said infrared light transmitting cover slide window is affixed to said infrared light transmitting crystal sample supporting substrate by a clamping means.

18. A method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filtometer, said method comprising the steps of:

providing a mounting means comprised of a first material having an aperture therethrough;

providing an infrared light transmitting crystal material,

forming an infrared light transmitting crystal sample supporting substrate of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling material from said infrared light transmitting crystal material to form an infrared light transmitting crystal sample supporting substrate that allows the passage of infrared light therethrough;

positioning the infrared light tranmitting crystal sample supporting substrate within the aperture so as to allow infrared light to pass through the aperture and the infrared light transmitting crystal sample supporting substrate and with no other material within the aperture that absorbs infrared light.

19. A method for the manufacture of a sample holder as defined in claim 18 wherein said step of providing a mounting means having an aperture comprises providing a disposable card or demountable card.

20. A method for the manufacture of a sample holder as defined in claim 18 further including the step of:

mounting the infrared light transmitting crystal sample supporting substrate to the holder in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of said aperture.

Claims 21-27. (canceled)

28. A method for the manufacture of a sample holder as defined in claim 18 further including the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to provide a means of sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

29. (canceled)

30. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a first material having infrared light transmissive properties such that the infrared light transmitting crystal substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling the infrared light transmittng crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a second material having at least one aperture adapted to fit within the spectrophotometer or filtometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal

sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the spectrophotometer or filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light though the sample, the infrared light transmitting crystal sample supporting substrate and the aperture and no other material within said aperture other than the sample that absorbs infrared light.

31. A method as defined in claim 30 wherein said step of providing a mounting means comprises providing a card made of a disposable material.

32. A method as defined in claim 31 wherein said step of providing an infrared light transmitting material comprises providing an alkali halide crystal material.

33. A method as defined in claim 32 wherein said step of providing an infrared light transmitting material comprises providing a material selected from the group consisting of KBr, NaCl and KCl

34. (canceled)

35. A method as defined in claim 31 wherein said step of providing a mounting means further comprises the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to form a means of sandwiching a sample between said infrared light transmitting cover

slide window and said infrared light transmitting crystal sample supporting substrate, said infrared light transmitting cover slide window being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling without precision optical polishing of the infrared light transmitting cover slide window.

36. A method as defined in claim 35 wherein said step of placing a sample to be analyzed comprises sandwiching the sample between the infrared light transmitting cover slide window and the infrared light transmitting crystal sample supporting.

37. A method as defined in claim 36 wherein said step placing a sample to be analyzed comprises placing a bacterial colony between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

38. (canceled)

39. A method for using a sample holder for use in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a mounting means comprised of a first material having a plurality of apertures adapted to fit within said infrared spectrophotometer or infrared filtometer, said mounting means being formed so as to be capable of orienting the apertures in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

providing an infrared light transmitting material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling or scaling said

infrared light transmitting crystal sample supporting substrates from said light transmitting material,

mounting one of said plurality of said infrared light transmitting crystal sample supporting substrates to the mounting means in a position wherein all or a centrally located part of one of said infrared light transmitting crystal sample supporting substrates is framed by the perimeter of at least one of the apertures,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into said infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with at least one of the apertures aligned with the infrared light emitted by the infrared light source to allow the passage of a beam of infrared light though one or more samples, said infrared light transmitting crystal sample supporting substrates and apertures and no other material other than the sample within said aperture that absorbs infrared light.

40. A method for using a sample holder as defined in claim 39 wherein said step of forming a plurality of apertures and infrared light transmitting crystal sample supporting substrates mounted thereon comprises forming the plurality of apertures and infrared light transmitting sample supporting substrates in a carousel configuration.

41. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample to be analyzed comprises placing a plurality of samples onto said plurality of infrared light transmitting crystal sample supporting substrates and said infrared spectrophotometer or infrared filtometer passes infrared light sequentially through said plurality of samples, said infrared light transmitting crystal sample supporting substrates and said apertures and no other material within said apertures that absorbs infrared light.

42. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample onto at least one of the infrared light transmitting crystal

sample supporting substrates comprises placing a bacterial colony onto said at least one infrared light transmitting sample supporting substrate.

43. A method for using a sample holder as defined in claim 40 wherein said step of inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into the infrared spectrophotometer or infrared filtometer comprises inserting the holder in a horizontal position within the infrared spectrophotometer or infrared filtometer and passing a beam of infrared light at least once through the sample, the infrared light transmitting crystal sample supporting substrates and the aperture.

44. A method for using a sample holder as defined in claim 43 wherein the beam of infrared light is passed at least once through the sample by means of reflection.

45. A method for using a sample holder for use in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a plurality of mounting means comprised of a first material, each having at least one aperture, each of said mounting means being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filtometer

providing an infrared light transmitting crystal material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the infrared light transmitting substrates do not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrates formed by cleaving, fly cutting, chipping, milling, or scaling infrared light transmitting crystal sample supporting substrates from said infrared light transmitting crystal material,

mounting one of said plurality of infrared light transmitting ,crystal sample supporting substrates to each of said plurality of mounting means in a position wherein all or a centrally located part of said sample supporting mounting means is framed by the perimeter of an apertures,

providing a mechanical carousel adapted to fit into the infrared spectrophotometer or infrared filtometer,

mounting said plurality of mounting means onto the mechanical carousel,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the carousel into the infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light in a sequential manner through the plurality of infrared light transmitting crystal sample supporting substrates, said samples and said apertures and no other material other that the samples within said apertures that absorb infrared light.

46. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filtometer, said

holder being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

inserting the holder into the infrared spectrophotometer or infrared filtometer to allow the passage of a beam of infrared light though the infrared light transmitting crystal sample supporting substrate to obtain one or more ~~a~~ background scans of the absorbance of the infrared light transmitting crystal sample supporting substrate,

placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light though the infrared light transmitting crystal sample suporting substrate and the sample located thereon and with no other material within said at least one aperture that absorbs infrared light to obtain a scan of the absorbance of the sample and the infrared light transmittting crystal sample supporting substrate, and,

using the one or more background scans to subtract the background absorbance of the infrared light transmitting crystal sample supporting substrate without the sample from the absorbance of the sample and the infrared light transmitting crystal sample supporting substrate.

47. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the

infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filtometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by the infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a medium onto the infrared light transmitting crystal sample supporting substrate with which a sample will be mixed,

inserting the holder into the infrared spectrophotometer or infrared filtometer to allow the passage of a beam of infrared light though the medium and the infrared light transmitting, crystal sample supporting substrate to obtain one or more a background scans of the infrared light transmitting crystal sample supporting substrate and the medium,

placing a sample to be analyzed mixed with the medium onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filtometer analytical instrument between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow infrared light though the infrared light transmitting crystal sample supporting substrate and the medium mixed with the sample and with no other material other than the sample within said at least one aperture that absorbs infrared light and,

using the one or more background scans to subtract the absorbances of the medium and the infrared light transmitting crystal sample supporting substrate from the absorbances of the medium, the infrared light transmitting crystal sample supporting substrate and the sample.

48. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing an alkali halide crystal powder on the infrared light transmitting crystal sample supporting substrate.

49. A method of using a sample holder as defined in claim 48 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing KBr powder on the infrared light transmitting crystal sample supporting substrate.

50. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing mineral oil on the infrared transmitting crystal sample supporting substrate.

51. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a solvent on the infrared light transmitting crystal sample supporting substrate.

52. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a mixture of KBr powder and a solvent or a mineral oil on the infrared light transmitting crystal sample supporting substrate.

53. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmittng crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the spectrophotometer or filtometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a bacterial colony to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the mounting means into the spectrophotometer or filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light though the bacterial colony, the infrared light transmitting crystal sample supporting substrate and the at least one aperture and with no other material other than the bacterial colony within said at least one aperture that absorbs infrared light.

PUBLICATIONS

"Phase Diagram of the CdP_2-$CdAs_2$ System", with V.A. Rubtsov, et al., *Phys. Stat. Sol. (a)* **115**, K155-K158 (1989).

"Processes of Nucleation and Crystal Growth of Boron Nitride Sphalerite Modification", E. Smolyarenko, V.P. Shipilo and L.M. Gameza, *Soviet Powder Metallurgy and Metal Ceamics* **1**, 52-58 (1988).

"Thermodynamic Properties of Solid Solutions $(Zn_xCd_{1-x})_3P_2$" E. Smolyarenko and V. Trukhan, *Inorganic Materials* **22** (9) (1986).

"Coefficient of Thermal Expansion of $(Zn_xCd_{1-x})_3P_2$ and $Zn_3(P_xAs_{1-x})_2$ Solid Solutions", E. Smolyarenko, V.A. Rubtsov, et al., *Bulletin of the Academy of Sciences of the BSSR* **6**, 111-113 (1986).

"Crystal Structure of ZnP_4 Compound", E. Smolyarenko, V.M. Trukhan, et al., *Crystal Research and Technology*, **21**(6), K93-K94 (1986).

"Phase Diagram of ZnP_2-CdP_2 System", E. Smolyarenko, V.M. Trukhan and A.P. Bologa, *Phys. Stat. Sol. (a)* **91**, K101-102 (1985).

"Phase Diagram of ZnP_2-$ZnAs_2$ System", E. Smolyarenko, V.M. Trukhan and A.P. Bologa, *Phys. Stat. Sol. (a)* **87**, K123-126 (1985).

"On the New Compound In Zn-P System", E. Smolyarenko and V.N. Yakimovich, *Proceedings of the BSSR Academy of Sciences (Doklady Akademii Nauk Bssr)* **27**(6), 517-519 (1983).

"Temperature Studies of Optical Properties of Cadmium Diphosphide Crystals", E. Smolyarenko, V.G. Fedotov, et al., *Phys. Stat. Sol. (a)* **76**, 121-126 (1983).

"Investigation of Temperature Dependence of Zinc Diphosphide Optical Properties", E. Smolyarenko, V.G. Fedotov, et al., *Jounal of Applied Spectroscopy* (translation of: *Zhurnal Prikladnoy Spectroscopii*) **35** (3), 6-9 (1981).

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